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15¢ A YEAR

August 12, 1961

VOL. 30, NO. 7 PAGE 1

SCIENCE NEWSLETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



In the Ocean Depths

See Page 101

A SCIENCE PUBLICATION



ELECTRONICS

Automatic Detectors

Machines being tested that may replace humans for use with search radar systems, doing away with errors due to fatigue or boredom.

► AUTOMATIC DETECTION machines for use with search radar systems are being tested by Navy researchers. The machines may replace the human operators who now decide whether return signals are "blips" from distant targets or interfering noise from harmless sources.

The machines, of course, do not make errors in judgment because of fatigue or boredom. In 200 test runs for a detector built by U. S. Navy technicians, there were "no false alarms and no misses," J. W. Caspers of the U. S. Navy Electronics Laboratory, San Diego, Calif., reports.

No way has been found to entirely eliminate interference in radar reception. The noise makes small targets a long distance away particularly difficult to detect.

The machines use computer techniques to process radar data and decide between noise and target signal on the basis of established statistical possibilities.

The usual scanning radar gets a fixed number of observations for each scan of the antenna. A detector that judges return signals from a fixed number of per-scan observations is called a fixed-sample detector.

Detectors that do not use a fixed number of observations are called sequential detectors. Sequential detectors, Mr. Caspers claims in the current Naval Research Reviews, July, 1961, offer "several advantages" over the fixed-sample type.

For each observation, a sequential detector makes one of three choices. It decides it has detected noise, or a target signal, or it decides the scanning antenna should take another observation to make sure.

Under this system, the antenna scans irregularly. It looks in one direction "just long enough for the detector to reach a decision and no longer," Mr. Caspers said.

With a sequential detector, the faster process saves from 30% to 90% of the detection time required for fixed-sample models.

The scanning process, however, must be modified to permit the sequential detector to hold the antenna beam in one position while detection judgments are being made, then move the beam to the next position when a decision is reached.

* Science News Letter, 80:98 August 12, 1961

GENERAL SCIENCE

Science in the Capital

► THE NATION'S capital is also a strong contender for honors as the nation's scientific capital.

The Washington, D. C., area has more scientific personnel per 1,000 population than any other in the nation.

The area's privately owned research and development firms have doubled in number since 1954, and quadrupled since 1950.

Some 24,100 persons, including 6,650 scientists and engineers, are employed by 270 private firms. Among these organizations are 190 doing research and development in the physical and life sciences, 53 in social and psychological research, and 27 specialists in documentation, operations research and computers.

Additionally, the Government's 30 research laboratories employ 36,200 persons. Of these, 12,200, or about one in three, are scientists and engineers.

The small size of many of the private firms "reflects the embryonic character of the Washington scientific community," according to Gordon Kennedy Jr., science bureau manager for the Metropolitan Washington Board of Trade. Eight of the research and development firms account for 50% of the employees, 63% have fewer than 51 employees, and 35% have fewer than 21. Many are showing "dramatic growth."

Federal research and development workers include 14,000 in weapons development, the largest single category. Medical research employs 9,000; mapping, 2,500; the Department of Agriculture, 3,300; the Bureau of Standards, 2,300; and weather and astronomy, 1,400. Only 1,400 are involved in space activities, but Mr. Kennedy predicts "a meteoric rise" in this field.

The private scientific community pays about \$145,000,000 in salaries and wages annually in the metropolitan Washington area. The Government research payroll is estimated at \$211,800,000 annually. The Greater Washington area includes Frederick and Annapolis, Md., and Leesburg, Va.

The Board of Trade's report on scientific resources is the first of its kind. It also points out that seven major universities in the Washington-Baltimore area contribute to the scientific climate through graduate instruction and research. Libraries and scientific academies, associations and societies are "legion," Mr. Kennedy noted.

The area includes the oldest electronics company in the United States. Vitro Electronics, in Silver Spring, Md., was founded in 1888. The company is responsible for the telemetry systems used in Project Mercury.

The report and directory, "Scientific Resources in the Washington, D. C., Area," is

available at \$2.00 a copy from Science Bureau, 1616 K St., N.W., Washington 6, D.C.

* Science News Letter, 80:98 August 12, 1961

CYTOLOGY

New Technique to Study What Makes Cells Stick

► A MEANS for studying what makes a white blood cell able to stick to things has been reported by Dr. James E. Garvin of the Northwestern University Medical School in Chicago.

Samples of human blood were mixed with heparin, a substance to prevent blood clotting, and poured through a two-inch-long column of more than 100,000 tiny glass beads into a glass tube. The phagocytes—cells that cling to bacteria in the blood and kill them—stuck to the beads.

The stickiness of the white blood cells and other cells is expected to shed some light on other problems besides the resistance of bacteria. The mechanics of adhesion may reveal how cells organize themselves and are held together to form body organs as well as what makes cancer cells break loose and spread in the body.

The white blood cells being studied by Dr. Garvin are the polymorphonuclear neutrophils (PMN), white cells with nuclei of many shapes. The results so far show that the adherence of PMN depends on some active process within the cell. Below 59 degrees Fahrenheit, the adhesiveness was lost.

Dr. Garvin reported his findings in the Journal of Experimental Medicine, 114:51, 1961.

* Science News Letter, 80:98 August 12, 1961

BOTANY

Chemical Helps Prevent Virus Plant Disease

► A CHEMICAL commonly added to agricultural solutions to make them cling to plants also helps prevent virus diseases in plants.

U. S. Department of Agriculture scientists at the Agricultural Research Center, Beltsville, Md., have found that the chemical compound, diocetyl sodium sulfosuccinate (DOSS), "markedly reduced development of five virus diseases in bean plants." Further tests are now underway to see if more insect-borne virus infections can be stopped, Dr. I. R. Schneider and J. W. Mitchell reported in Agricultural Research, 10:4, 1961.

"How DOSS is able to inhibit virus is still not known," the scientists reported, but its effectiveness is directly related to its ability to reduce surface tension of the water found on plants.

The chemical compound was highly effective against the mosaic viruses that attack tobacco, beans and alfalfa and cause a stained or mottled appearance.

"DOSS is not a cure for plants with established virus diseases," the scientist emphasized, but rather a preventive.

* Science News Letter, 80:98 August 12, 1961

MEDICINE

Venom Against Fungus

Fire ant, growing problem, produces a venom that inhibits 15 out of 21 fungus organisms and can repress some bacterial infections.

► **FIFTEEN** of 21 fungus organisms, most of which infect humans, were held in check by fire ant venom, a study has revealed.

The fire ant is a growing problem in the southeastern United States. Its bite is extremely painful and can cause allergic shock reactions, but previous studies have shown that its venom could repress some bacterial infections. The venom also inhibits the growth of fungus infections, Drs. James T. Sinski, George A. Adrouny, Vincent J. Derbes and Rodney C. Jung of Tulane University School of Medicine, New Orleans, have found. The anti-fungal action was shown by a lack of growth immediately surrounding a crystal of the venomous material placed in direct contact with the fungus being tested.

Among other investigations reported in the Public Health Service's publication "Highlights of Research Progress in Allergy and Infectious Diseases, 1960," is one that discounts the treatment value of artificially ionized air for patients with asthma. Dr. Bernard Zylberberg of the National Jewish Hospital, Denver, collaborated with Dr. M. H. Loveless of Cornell University in conducting experiments on the value of ionization for asthmatics.

A study of virus infections in Harlem apartment house mice was reported by

Drs. Wallace P. Rowe, Robert J. Huebner and Janet W. Hartley, all of the National Institute of Allergy and Infectious Diseases, Bethesda, Md. The mouse study sought to determine whether the polyoma virus that produces multiple tumors in laboratory mice is found also in mice associated with the ordinary human environment.

Although mouse polyoma virus does not

ENTOMOLOGY

Ants Follow Military Rules

► **THE ARMY ANTS** that cut a destructive swath through Central American jungles devouring just about any insect in their way go strictly by the military books during these raids.

Dr. T. C. Schneirla of the American Museum of Natural History, New York, has found that these insects have a two-pronged attack consisting of daily raids with new bivouacs each night, followed by a phase of small raids from one camp, to which they return each night. The first lasts from 12 days to two weeks, the second approximately three weeks.

cause human disease, its study is of considerable importance in research on the possible virus cause of certain forms of human cancer. The investigators, who were assisted in their research by the New York City Health and Sanitation Department, found that certain blocks and certain apartment houses in the same block showed marked differences in the frequency of infection.

Dr. Karl Habel, chief of the Institute's Laboratory of Biology of Viruses, and his associates reported a somewhat related investigation in the PHS publication. In a study of the factors responsible for the tumor-producing properties of polyoma viruses, they found that once the tumor has been started, it may be unnecessary to maintain the virus to continue growth of the tumor.

* Science News Letter, 80:99 August 12, 1961

During the first attack, a wave of thousands of these ants advances through the dense jungle in columns as wide as 60 feet. Towards dusk, the column stops and "bunks" down for the night. The bivouac is formed by chains of ants linked from a log or vine to the ground. The ant "ropes" eventually merge, forming a wall enclosing a pocket of air, within which the queen rests.

The casualty rate for each swarm is very high. New broods frequently bolster the ranks, keeping the troops at approximately the same strength from month to month, or even year to year, Dr. Schneirla found during his studies of the army ant on Barro Colorado Island, tropical wildlife reserve in the Canal Zone of the Smithsonian Institution, Washington.

* Science News Letter, 80:99 August 12, 1961

GENERAL SCIENCE

Readers Give SNLs to Asian Students, Teachers

► **STUDENTS** and teachers in Asia have received with enthusiasm the gifts of copies of SCIENCE NEWS LETTER that have been sent to Magazines For Friendship in Los Angeles by readers who are willing to part with them for this purpose.

"There is such a tremendous interest in science and the SCIENCE NEWS LETTER covers the field in such an informative and interesting way," Mrs. Sophie Mayers of that organization declared. "One teacher wrote us that it was the best material he had ever seen and another that it was his only up-to-date science material."

Readers who wish to participate in this volunteer effort are invited to send a stamped self addressed envelope to Magazines, Box 3196, Los Angeles 28, Calif.

* Science News Letter, 80:99 August 12, 1961

In 1960-61 53,107 foreign students were enrolled in 1,666 U. S. colleges.



TARGET DOWNED—The Q-4B jet-powered target drone has been brought down safely by parachute, the landing shock mostly absorbed by automatically inflated impact bags. With a minimum of repairs, it will be ready to serve as a missile target again.

AERONAUTICS

New Plane Features

Light airplanes are now being designed with more features intended to lower fatality rates. Unless cabin collapses, pilot should now survive a crash.

► **LIGHT AIRPLANES** such as those used for crop-dusting are being designed with more "crashworthy" features, and the trend is toward lower fatality rates.

Karl H. Bergey, engineer with Piper Aircraft Corporation, Lock Haven, Pa., points out that during 880,000 hours of agricultural flying in 1959, there was one accident for each 3,000 hours, and one death for each 16,000 hours.

Newer planes, however, fared better than the overall averages. Planes designed within the preceding decade had one accident for each 4,000 hours of flying, and one death for each 90,000 hours.

Unless the cabin of the aircraft collapses or disintegrates, the pilot should survive a crash, Mr. Bergey said.

He recommends short, lightweight power plants, placed well forward from the cabin, and seats for pilots and passengers "as far behind the wing as possible."

MEDICINE

Virus Causes Lung Cancer

► **LUNG CANCER** in animals can be spread through the respiratory tract as easily as the common cold can be transmitted from one individual to another.

Although the virus-caused animal cancer, polyoma, is usually found in mice, Dr. Theodore Burnstein of the University of Miami Medical School and Miami's Variety Children's Research Foundation produced this type of tumor in the lungs of hamsters merely by having the animals inhale polyoma virus.

Of 38 hamsters receiving unfiltered polyoma virus intranasally, nine developed visceral tumors, 14 developed lung and visceral tumors, and 15, lung tumors alone. The neoplastic changes were induced in an average of 35 days. When filtered virus was inhaled, two of 19 hamsters developed lung tumors in 85 to 92 days respectively.

Animals with lung involvement were thinner than controls and respiration rate count went up before death, but there was no coughing.

Almost no lung tumors appeared in animals receiving polyoma virus via other routes, in the brain, body cavity or under the skin.

Although considerable work on the production of lung tumors in mice by chemical carcinogens has been reported, Dr. Burnstein said, only one research group reports virus-induced lung tumors in hamsters, and these lung tumors followed subcutaneous — not intranasal — injection of polyoma virus.

The wings should be low on the fuselage. Fuel tanks should be located in or on the wings, but as far out as possible to lessen fire dangers, as in the Cessna 310 and the Piper Apache. Locks should be designed to "make the door an integral part of the cabin structure when closed."

Nearly 80% of the deaths in light aircraft accidents are from head injuries, Mr. Bergey stressed. Chances of head injuries are lowered by wearing safety belts, hard hats and shoulder harness.

Safety belts have been accepted by the flying public. Shoulder harness has been greeted with "monumental indifference," and should be publicized.

"To make this effective, some modification of the polite fiction that airplanes do not crash would be required," Mr. Bergey said in the SAE (Society of Automotive Engineers) Journal, 69:54, 1961.

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VITAL STATISTICS

Illegitimacy Rate High for Teen-Agers

► **THE ILLEGITIMACY** ratio is highest for teen-agers, particularly under 15 years old, the U. S. Public Health Service reported.

Detailed figures now released for 1959 show the number of illegitimate births at an estimated 221,000 out of a total number of 4,295,000 live births. Young mothers under 15 were estimated to have 679 illegitimate births per 1,000 live births. At ages 15-17 years, the ratio was 242 per 1,000 live births, and at ages 18 and 19, 106 per 1,000 live births.

Only 34 states and the District of Columbia reported illegitimate live births, so the total figure was based on estimates for nonreporting states.

The first four months of 1961 showed a sizable increase in the number of U. S. births over the same period in 1960, perhaps due to an increase in the number of

marriages, which rose by about two percent between 1959 and 1960.

Of the 1959 births, there were 40,000 more reported than in 1958. Of the 4,295,000 live births in 1959, 51% were of a first or second child, 19% of a third child and 29% of a fourth or later child. The percentage of fourth or subsequent children in 1959 was significantly higher than in 1958.

Half the women having their first child in 1959 were under 21.6 years old, slightly lower than the 21.8 figure for 1958. Women aged 20-24 had the highest birth rate, with about one out of four giving birth to a baby in 1959.

• Science News Letter, 80:100 August 12, 1961

Bear may cause a profound reduction of coagulation in the blood of healthy persons.

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OCEANOGRAPHY

Conquering Inner Space—Oceans

A new U. S. emphasis in exploring and solving the secrets of the oceans promises to yield many benefits for mankind, Vincent Marteka reports.

See Front Cover

THE OCEANS blanket nearly three quarters of the globe, yet scientists still know less about the oceans than the moon.

Although a bathyscaphe has bumped bottom in the deepest part of the ocean and oil-well drilling rigs now dot the offshore shallows, scientists still know very little about the huge area between the ocean's edge and the deepest portion.

U. S. scientists are now trying to plug this gap by planning extensive programs to chart the huge ocean expanses, plumb the ocean depths and sample the ocean bottoms. Their purpose: to push back the long-ignored oceanographic frontiers, solidify the defense of U. S. shores, and extract the wealth of minerals and food from the oceans.

Tremendous fish life and untold mineral wealth lie waiting in the ocean depths for man's use, as shown in the picture on the cover of this week's SCIENCE NEWS LETTER.

A man standing on Mars would see the earth as a watery planet with the continents floating like islands on a salty sea. Yet man still thinks of the earth as land.

The ocean bottom lying underneath 1.5 billion tons of water is a huge uncharted tract seldom touched by man's probing instruments. Although oceanographic surveys have discovered major mountain ranges, deep ocean trenches and isolated mountains, only two percent of the ocean bottom is adequately charted. Much of it was mapped during the International Geophysical Year.

Most of the underwater mapping has been limited to the continental shelf, an underwater lip of land skirting the continents.

The swirling currents and teeming sea life of the ocean depths still pose a large mystery to oceanographers. Last year Swiss scientist Jacques Piccard plunged in a bathyscaphe nearly seven miles into the deepest part of the Pacific Ocean and found, to the surprise of scientists, that fish could live at such depths.

Influence Climate

The extensive oceans also greatly influence the earth's climate. The oceans store huge quantities of heat, acting as a huge heat engine that drives the circulation of the atmosphere. By learning more about the relationship between the oceans and the atmosphere, man may one day control his climate.

With the threat of Russian nuclear-powered submarines slipping through outmoded U. S. defenses, scientists must develop sophisticated instruments that can

"see" the enemy subs, and also chart "road-maps" of the ocean bottoms for U. S. submarines. The U. S. Navy, realizing the military importance of making the seas transparent, recently announced a 10-year, \$1 billion oceanography program to build more oceanographic ships and to learn more about the "shape and nature" of the oceans.

By conducting oceanographic research, scientists can find currents and layers that either muffle, stop or conduct sound waves from sonar instruments.

One of the most promising sonar systems, Artemis, evolved from oceanographic research. The system, currently being tested at sea, uses huge ship-borne sound-makers lowered to depths where sound travels best. The sound waves would bounce off submarines trespassing a vast network, and the waves would be picked up by underwater phones and radioed to shore.

With the crowding of land by a skyrocketing population, man may soon count on the sea for food. About one-tenth of the food consumed in the United States comes from the oceans. Besides this, some 2½ billion pounds of fish used as animal feed and oil indirectly benefit humans.

To Increase Harvest

In order to increase the potential harvest, more studies are needed not only on the whereabouts and movement of fish, but also the distribution of water temperature, salt content and the fish's food supply.

"Until such studies mature, man must be hunters rather than farmers, searching out the game and capturing them, rather than raising them as done on land," Dr. Harris B. Stewart, chief oceanographer of the U. S. Coast and Geodetic Survey, told SCIENCE SERVICE.

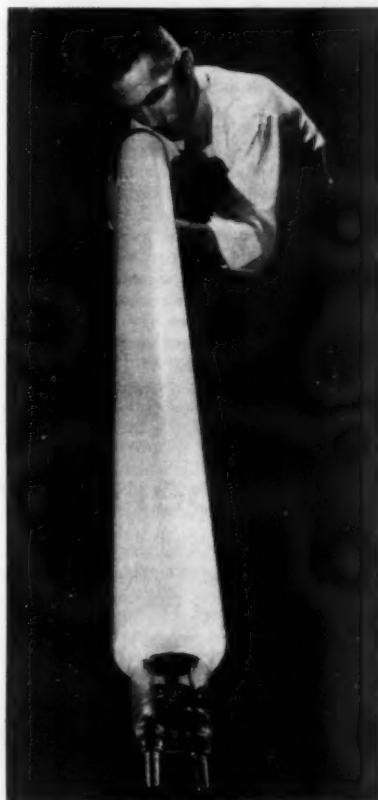
The ocean bottom and the waters themselves hold rich storehouses of minerals. Since the oceans first formed a few billion years ago, the mineral resources of the land have been eroded and washed into the seas by rivers. Huge chunks of rich manganese-cobalt-iron "ore," some as large as grapefruits, are strewn along many ocean bottoms. Some scientists believe they are the work of microscopic organisms that can concentrate these minerals in an unknown manner.

Although the oceans are looked upon as a possible cure-all for many of the world's future problems, care must be exercised as to the proper use of this expanse of no-man's land. Past history has taught how man abuses his resources by stripping the forests, indiscriminately using up the mineral resources and polluting lakes and

streams. Already, the oceans are being used as a dumping spot for the radioactive wastes of the nuclear age. Scientists must first learn more about the silent ways of ocean currents, for they could spread the contamination and curtail the use of the oceans for thousands of years.

The new emphasis on oceanography has captured the imagination of layman and scientist alike. Scientists predict that oceans in the near future will be criss-crossed with defensive, meteorological and oceanographic networks. Automatic weather stations bobbing on the surface will constantly chart the changing sub-surface currents, temperatures and salinity, so that "weather maps" can be issued for underwater travelers. Remote-controlled robots housing a TV "eye" will pick up samples of the ocean floor while nuclear-powered "pods" filled with passengers or commercial goods glide by on the way to distant ports.

In the shallower basins, sea "farms" will



RECORD LAMP—This five-foot-long lamp is believed the largest mercury-fluorescent lamp in the country. Four inches in diameter, it produces as much light as 400 household bulbs and is intended for large-area floodlighting.

be growing shellfish, fish and "ores" with methods gleaned from oceanographic research.

The United States has already made a big step in this direction. The U. S. Navy, along with its anti-submarine systems, now route ships through ocean lanes where waves offer the least resistance. The U. S. Weather Bureau has an experimental floating weather station that once hinted when Hurricane Diana was brewing off the coast.

Scripps Institution of Oceanography scientists have a remote-controlled "robot" patrolling the Pacific Coast fringes, while scientists from Project Mohole have already penetrated the once-mysterious volcanic layer underlying the soft ocean bottom sediments.

MEDICINE

Acids Linked to Immunity

► VIROLOGISTS have a new dimension to use following discovery that free viral nucleic acids are infectious.

Dr. Roger M. Herriott, professor of biochemistry in the Johns Hopkins University School of Hygiene and Public Health, focuses attention on properties of viral nucleic acids that may lie behind the reasons for permanent immunity.

The resistance of infectious nucleic acids to antibodies, Dr. Herriott reports in *Science*: 134, 256, 1961, may explain some conditions that are at present baffling.

The infective nature of viral nucleic acids (the stuff of life) was discovered first in plant viruses and then demonstrated for poliomyelitis and a variety of diseases.

The scientist points out that after recovery from certain virus-caused diseases such as polio or yellow fever, individuals are permanently immune to the agent.

"To account for this," Dr. Herriott says, "it has sometimes been thought that perhaps

These feats have been matched by Woods Hole Oceanographic Institution scientists who are planning to string a line of unmanned monitored buoys from Cape Cod to Bermuda to continuously collect oceanographic data.

The sign that oceanography came of age was reflected in President Kennedy's 1961 budget request to Congress for \$97,000,000—nearly double the amount spent on oceanography last year. Bills pending before Congress would give President Kennedy's program a further push.

"Knowledge of the oceans is more than a matter of curiosity. Our very survival may hinge on it," the President declared in a special message to Congress.

• *Science News Letter*, 80:101 August 12, 1961

in these cases there is a very low level infection maintaining a stimulus for antibody formation."

The infectious nucleic acid provides a model for maintaining an infection in the presence of antibodies, he says. "Released nucleic acid would infect a few susceptible cells and maintain the infection. The larger range of cell hosts for the nucleic acid may be particularly important in this connection."

Summarizing, Dr. Herriott says, "Viral nucleic acids have been found to be infectious for tissues and animals, yet are nonantigenic and resistant to antibodies against whole virus."

"The release from infected tissues of even a small proportion of total virus as free nucleic acid could, in an otherwise immune individual, lead to a low level of infection which would, perhaps, explain permanent immunity."

• *Science News Letter*, 80:102 August 12, 1961

more. They had grown up in families of middle to high income, in medium to substantial neighborhoods, the researchers found.

This meant that the college men were living and working in a social environment with which they had a lifetime familiarity.

• *Science News Letter*, 80:102 August 12, 1961

PHYSICS

Ancient Principle Might Have Saved Capsule

► THE SPACE-AGE capsule lost after the U. S. second successful manned space shot probably might have been saved by applying a scientific principle advanced more than 2,000 years ago by the Greek philosopher, Archimedes.

According to Archimedes' principle, the Liberty Bell 7 capsule, even flooded with water, would weigh less in water than it did in air, due to the buoyant effect of water. By releasing more cable and letting the capsule sink a few feet below the ocean surface, the rescuing helicopter probably could have held on until help arrived.

During actual rescue operations, the capsule was cut loose from a hovering helicopter when its motor overheated as it was trying to lift the capsule.

Archimedes noted that lighter, or less dense, material is more buoyant in water than heavier materials. Scientists now wonder whether the vacuum-packed instrument packages, the padded fiber-glass space seat, and other lightweight materials within the capsule could have helped lessen the average density of the submerged metal capsule, making it much more buoyant or lighter than in air.

National Aeronautics and Space Administration scientists are meanwhile keeping silent as to the exact materials contained in the Liberty Bell 7 capsule.

• *Science News Letter*, 80:102 August 12, 1961

PHYSICS

Solid Matter Viewed Directly by X-Rays

► A METHOD for direct visual observation of the interior of solid materials, such as metals, was reported to the American Crystallographic Association in Boulder, Colo.

Drs. G. W. Goetze and Abraham Taylor of Westinghouse Electric Corporation, Pittsburgh, said the system is an improved method of X-ray diffraction—a means for observing the patterns formed by passing X-rays through a crystal. The diffraction pattern of a material is its "fingerprint," a positive identification of the nature of the material and the alignment of its crystals.

In the new system, the diffraction pattern strikes a photosensitive surface, from which an identical pattern of electrons is released. The electrons in turn strike an amplifying surface, the emission of which excites a photosensitive output surface, creating a visible image some 100 times larger than the original. Greater magnifications are possible with larger and more powerful X-ray sources.

• *Science News Letter*, 80:102 August 12, 1961

PSYCHOLOGY

"Climbers" Prone to Illness

► "NONHAZARDOUS" occupations can be dangerous for men who work their way up.

Eighty-four out of 139 young men between the ages of 22 and 32 who had attained managerial positions showed more illness than 55 co-workers who stepped into the same kind of job right out of college.

Dr. William N. Christensen and Lawrence E. Hinkle Jr., both of the departments of medicine and psychiatry, New York Hospital-Cornell Medical Center, reported in the *Journal of the American Medical Association*, 177:247, 1961, that the men who had worked their way up displayed both acute and chronic symptoms, including signs indicating eventual high blood pressure and hardening of the arteries.

The physicians tested diet and smoking habits, hereditary factors and social back-

ground among other points to show that illness is caused by complex biological interactions taking place between man and his environment.

The men who were sick more often were sons or grandsons of immigrants. Their fathers had been skilled and unskilled laborers. They had grown up in modest to substandard neighborhoods in low-income families where the fathers generally had a grammar-school education or less.

As a result their climb up the ladder of success was full of challenges, threats, demands and other factors of a domestic and financial nature. The place they gained at the top was unfamiliar to them.

The college graduates, with few exceptions, were fourth-generation Americans, the sons of managers and other types of white-collar workers who had acquired at least a high-school education and often

CHEMISTRY

Cold Yeasts Give Lower Melting Point Fats

► YEASTS that grow in cold temperatures tend to produce fats that melt at a lower temperature than those grown at normal room temperature, M. Kates and R. M. Baxter of the National Research Council, Ottawa, reported to the Chemical Institute of Canada in Montreal.

Since the low melting point fats are more unsaturated, they are believed to be less favorable to cholesterol formation in the blood which is involved in arteriosclerosis or hardening of the arteries.

Where essential oils such as perfumes originate can be told by chemical analysis, Leo Levi of the Canadian Food and Drug Directorate, Ottawa, told the meeting. Determination of source, botanically and geographically, of essential oil bearing plants plays a role in quality.

* Science News Letter, 80:103 August 12, 1961

GENERAL SCIENCE

Scholarships for Science Writing Advocated

► SCHOLARSHIPS for journalism graduates and working newspaper writers to enable them to learn more science were one of the principal recommendations announced by SCIENCE SERVICE as the result of a conference of journalism school deans and representative scientists, editors and science writers.

"On the job" training for reporters assigned to cover science was also advocated. Journalism schools were urged to extend their resources through seminars, conferences and informal contacts with science writers.

The conference also expressed interest in development of testing programs for identifying those who are capable of becoming science writers. For promoting the interest of those who will become science writers in the future, it was recommended that opportunities in science writing be brought to the attention of high school students.

All the nation's schools of journalism reporting major attention to science writing were invited to this conference on the "Role of Schools of Journalism in the Professional Training of Science Writers." The conference was conducted June 9 and 10 under a National Science Foundation grant by SCIENCE SERVICE.

At the suggestion of the conference, the report of the conference is being circulated to schools and departments of journalism of American and Canadian colleges.

The journalism representatives went on record as being opposed to the formulation of arbitrary curricula in education for science writing, since individual programs should depend upon the individual's special talents.

The conference favored the continued support of conferences that bring editors of newspapers, scientists, and science writers together to discuss problems and ideas about the coverage of science for newspapers.

Lists of books and other source material for use by science writers for background should be compiled and circulated, the conference suggested.

A limited number of copies of the full report are available to those especially interested from SCIENCE SERVICE, Washington.

* Science News Letter, 80:103 August 12, 1961

GEOLOGY

Rare Mineral Solving Origin of Earth's Craters

► A RARE MINERAL is helping to unravel the mysteries surrounding the origin of earth's deep craters.

Coesite has been settling age-old arguments as to whether certain craters formed from volcanic upheavals or from meteorites crashing into the earth. Coesite is a form of quartz whose atoms are rearranged when a meteorite buries itself in the earth.

U. S. Geological Survey scientists in the one year since its discovery have found coesite in craters on four continents, proving the depressions were meteorite-formed. An Asian desert crater, an African lake and a 17-mile-wide German depression contained coesite. The famous Meteor Crater in Arizona, about whose origin there was no doubt, also contains coesite, which occurs as tiny "stringers" in broken quartz grains.

The tremendous pressures generated when huge meteorites smash into the earth's surface transform some of the quartz found in rock to coesite.

The "astrogeologic" unit of the Geological Survey is led by Dr. E. M. Shoemaker, and is partly supported by the National Aeronautics and Space Administration. The Survey scientists hope the work will eventually lead to the exact identification of supposed meteorite craters on the moon.

* Science News Letter, 80:103 August 12, 1961

GENERAL SCIENCE

Large Colleges Hold 40% Of Total Science Faculty

► SCIENCE AND ENGINEERING teachers at U. S. colleges and universities tend to be highly concentrated in a relatively small number of institutions with large enrollments, a National Science Foundation study shows.

The Foundation survey covered 1,916 institutions. Only 67 of these, all with enrollments of 10,000 or more, employed almost 40% of the 100,000 science and engineering faculty members reported for all the schools. Fifteen schools with enrollments of 20,000 or more employed 17.7% of the 100,000 total.

The concentration was even more sharply pronounced for the 57,000 listed as non-faculty science and engineering personnel, principally research workers. The 15 largest institutions employed 32%, while the 52 schools in the 10,000-to-20,000 enrollment class employed 26.4%.

The 157,000 scientists and engineers working for colleges and universities made up about half of the 311,000 total for professional personnel.

* Science News Letter, 80:103 August 12, 1961

ECONOMICS

Soviets Get Big Returns From Small Asian Outlay

► IN GIVING AID to Asia's underdeveloped countries, Soviet Russia has gotten maximum effects from a minimum investment by backing projects with high propaganda value within a few key countries.

Actually, the total extent of this aid has not been "overwhelmingly large," Stefan C. Stolte points out in the Bulletin of the Institute for the Study of the USSR, published in Munich.

From 1954 to 1960, the Soviets claim, they gave about \$1.5 billion in long-term credits to six non-Communist Asian countries. More than half of this went to India. From 1955 to 1960, the United States gave more than \$2.7 billion in aid to Asia's non-Communist countries.

The Soviets have concentrated on industrial projects, such as the steel works at Bhilai in India, to win the help of important political and economic groups believing that rapid industrialization is a "must" for an underdeveloped country.

Other Soviet aid has gone to Indonesia, Iraq, Afghanistan, Ceylon and Yemen. Afghanistan is the only one that "shows any serious likelihood of becoming a satellite of Moscow," Mr. Stolte believes.

India, despite its officially neutral stand, "is the only opponent to Communism that is of decisive importance in Asia," he asserts. India alone has some 357,000,000 people, compared to the 283,000,000 who live in the ten Asian countries now belonging to pro-Western military alliances, and the 100,000,000 in four countries now on friendly terms with the Eastern bloc.

In May, India began her third five-year expansion plan, budgeted at about \$14 billion. The Western powers have offered to contribute \$2.5 billion of this in long-term credits. This is more than all the Soviet economic aid given in non-Communist Asia to date.

In its economic build-up, India may be ahead of Communist China in per capita output of electricity, cement and cotton fabrics, but is behind in coal and steel, statistics from Communist sources indicate.

Overall, Asia's non-Communist areas are "tempting prey" to the Communists because they are militarily weak, have such large populations that they can shift the balance of world political power, and offer great possibilities for production of trade goods, Mr. Stolte said. They are already important as sources of rubber, tin, oil, rice and tea.

The main problem of underdeveloped countries, however, is disposing of their raw materials, and Mr. Stolte predicts they will get little help from the Eastern bloc for some time. The East is trying to get away from reliance on imported raw materials. The West, on the other hand, is steadily increasing its import program.

* Science News Letter, 80:103 August 12, 1961

Super sensitive films have opened the door to almost universal use of photographic instrumentation for intricate research under difficult conditions.

BOTANY

Radio Impulses Help Germination of Seeds

► EXPOSURE to electromagnetic waves in the radio frequency range stimulates the germination of certain seeds.

The U. S. Department of Agriculture reports that exposure increased the germination of alfalfa seed 35% in laboratory studies.

Smaller germination increases were observed in other plants. There was a 12% increase in the germination of red clover exposed to electromagnetic energy, and the germination of treated unhulled crown vetch almost doubled. Corn germination was not consistently affected, but in some cases, exposure stimulated it considerably.

It is not known yet whether the improved germination due to radio waves at a frequency of 39 megacycles per second and a field intensity of 3,000 volts per inch results from chemical or physical changes in the seed or from both. However, scientists do know that exposure to radio frequency waves changes the sugars of certain varieties and increases the capacity of some hard seeds to absorb water.

This treatment might also be effective in killing weeds in crop seeds and certain pests of stored grain without damage to the grain itself.

Stuart O. Nelson of the U. S. Department of Agriculture conducted the experiments with the cooperation of Nebraska Agricultural Experiment Station scientists at Lincoln.

• Science News Letter, 80:104 August 12, 1961

ARCHAEOLOGY

Patina on Flints Can Indicate Age

► WHEN archaeologists dig up the flint tools of an ancient people, they can, by studying the crust or patina on the flint, get an idea of the age of the tools.

Attempts to correlate the thickness of the patina with age have, in the past, been disappointing because many other factors besides mere age must be taken into account.

What these factors are and how they affect the flint is reported in *Science* 134:251, 1961, by a geologist-anthropologist team of the University of Georgia, Athens, Dr. Vernon J. Hurst and Dr. A. R. Kelly.

The rate of patination varies, they report, with the texture and microstructure of the flint; its permeability; the kind, proportion, and distribution of impurities; and environmental factors such as temperature and soil chemistry.

The thickness of the patina also varies with time.

The first three of the factors affecting patination can be evaluated by regular petrographic techniques, the scientists report. Environmental factors can be assumed to be constant for objects found in the same type of soil in a given climatic region.

Color is important in the study of flints. In most flints, the color is the result of repeated refraction and reflection of the

light at numerous intergranular surfaces where part of the light is absorbed and part is reflected. Color changes during patination come about as weathering agents attack impurities in the flint, leaching out carbonates, loosening quartz crystallites and dispersing clays. These all affect the reflectivity of the flint and its capacity to absorb preferentially.

• Science News Letter, 80:104 August 12, 1961

PUBLIC SAFETY

Young Amputees Used Power Tools on Farm

► YOUTHFUL USERS of power and farm tools formed the largest group of amputees in 203 persons under 21 seen at a Midwestern clinic. The average age of the 53 amputees in this group was 11.

Also averaging age 11 were amputees that had suffered gunshot and explosion wounds. Fifty young people aged 10 months to 20 years had to have amputations for these reasons.

Third on the list were 41 young amputees between the ages of 2 and 20 who were involved in vehicular accidents. Railroad accidents accounted for 28 amputees. Household mishaps accounted for 16, the average age of the victims being under four years.

Childhood recreation accidents caused eight amputations and burns caused seven.

Dr. George T. Aitken, medical codirector of the Area Child Amputee Center in Grand Rapids, Mich., reports findings of the study in *The New England Journal of Medicine*, 265:133, 1961.

He concluded that a large number of the injuries could have been prevented, and especially called attention to indications that children living in rural communities are permitted to do chores "possibly too early" that require the use of power-driven tools.

The clinic from which the figures were drawn serves not only Michigan but surrounding areas.

• Science News Letter, 80:104 August 12, 1961

PHYSICS

Fire Extinguished by Spraying Empty Air

► NEARLY ALL FIRES can be put out quickly by spraying the air surrounding the fire with a chemical extinguishing agent.

The method is as much as 20 times more effective than spraying the fire itself, research conducted by E. C. Creitz at the National Bureau of Standards fire research laboratory in Washington has shown.

Why spraying the surrounding air extinguishes fires is still unknown. The present study covered fires in which air and fuel are not mixed prior to combustion, such as in match and candle flames.

The study has also re-kindled the controversy of what happens within hot flames. Mr. Creitz believes the extinguishing agent (inhibitor) breaks an "ionic" chain process in the flames, whereas most scientists hold that the chain links are hydrogen atoms and not ions.

• Science News Letter, 80:104 August 12, 1961

IN SCIENCE

GENERAL SCIENCE

U.S. and U.N. Urged To Set Up Science Agency

► A STRONG RECOMMENDATION that the United States and the United Nations each create an Institute of Scientific Information has been made by a political scientist, Prof. Bertram M. Gross of Syracuse University, Syracuse, N. Y., as a partial solution to the current information crisis.

He called the information crisis "a world problem" and "a tragic waste of human knowledge" resulting from man's ability to produce more information than he can assimilate, analyze, store or distribute.

"It is estimated that every minute 2,000 pages of books, newspapers or reports are published somewhere in the world . . . enough to fill a thousand feet of bookshelves every day," Prof. Gross said. This "paper flood of information," will continue to rise, he predicted.

Prof. Gross therefore urged "full exploitation of modern technology to develop a large-scale program of information retrieval." He outlined plans for assembling and disseminating scientific and technical information by the proposed Institutes of Scientific Information.

• Science News Letter, 80:104 August 12, 1961

GEOLOGY

Great Lakes Created By Ancient Rivers

► THE GREAT LAKES were carved out of rock by ancient rivers and not by the glaciers that periodically blanketed North America many thousands of years ago.

Drill cores taken from the depths of Lake Superior strongly indicate that glacial deposits on the bottom of the Great Lakes were laid down in deep rocky valleys existing long before the last ice sheet retreated northward 10,000 years ago. The drilling conducted from ships was the first such attempt to probe into the geological history.

A complex river system that either emptied into Hudson Bay or cut through the St. Lawrence River Valley was largely responsible in forming the pre-glacial valleys, University of Michigan geologist Dr. James H. Zumberge believes. Ice sheets, gouging out the land as they crept along, later piled up dam-like deposits in the valleys, backing up the waters to form the Great Lakes.

University of Michigan and University of Minnesota geologists teamed up on the Lake Superior project, which was supported by the National Science Foundation.

Anchored in nearly 1,000-foot deep water, the scientists once drilled 684 feet into the softer deposits without reaching the ancient bedrock valley. Another drilling site brought up a 500,000,000-year-old rock, the oldest taken from any Great Lakes bottom.

• Science News Letter, 80:104 August 12, 1961

NE FIELDS

TECHNOLOGY

Three Machines Linked To Speed Editing Chores

► A COMPUTER, a tape-punching typewriter and a photographic typesetting machine have been linked at Massachusetts Institute of Technology, Cambridge, Mass., in a system capable of handling the mechanical details of editing a 400-page book in a few hours.

The typewriter is first used to produce a draft of the material and, at the same time, a paper tape with the text punched in code. When the draft is proofread, typing simple editing instructions also produces a correction tape.

Both tapes are fed to the computer, which makes the requested changes at high speed and produces a master tape of the corrected text.

The master tape, including orders for letter size, printing style and format, then goes into the typesetter. This machine turns out a finished positive ready for immediate printing by offset or letter press methods.

The system was developed by Dr. Michael P. Barnett and Kalon L. Kelley during their work with electronic computers as part of research in theoretical chemistry. They used an IBM 709 computer, made available through a grant from International Business Machines Corporation, New York, and a typesetter developed by Photon, Inc., also in Cambridge.

MIT library officials are interested in the system as a means of updating books that must be revised periodically, such as catalogues and directories. The computer can sort random catalogue entries into proper sequence while simultaneously constructing elaborate indexes.

* Science News Letter, 80:105 August 12, 1961

MEDICINE

Excess Salt Can Cause High Blood Pressure

► EXCESS SALT appears to cause high blood pressure, but a salt-free diet is not always a cure for it.

Only about one-fourth to one-third of patients with high blood pressure respond to salt restriction. Because their blood pressure does not fall, it has been thought that excessive salt intake was not a cause of the hypertension.

However, animal experiments indicate that the initial cause can still be excess salt. Dr. Lewis K. Dahl of the Medical Research Center, Brookhaven National Laboratory, Upton, N. Y., reported in *The Journal of Experimental Medicine*, 114:231, 1961, that all 35 female rats he tested became hypertensive during a year of continuous excess salt feeding.

When the salt was withdrawn from the

diet, about two-thirds of the animals failed to show a significant fall in blood pressure.

"The hypertension so induced appeared to be self-sustaining," Dr. Dahl said.

The results of these experiments are in accord with other studies of hypertension that was brought on by different means but continued after the original exciting cause was removed.

In humans, hypertension sometimes develops after one kidney is involved, Dr. Dahl said, but removal of the affected kidney may fail to diminish the blood pressure, particularly if the condition has been of relatively long duration.

* Science News Letter, 80:105 August 12, 1961

PUBLIC HEALTH

Sports Not Enough To Assure Youth Fitness

► STUDENTS in junior and senior high schools who take part in athletic programs, train with the ROTC or march with the school band should not be allowed to substitute these extracurricular activities for regular class work in physical education, says the President's Council on Youth Fitness.

In grades 7 through 12, "an athletic program alone does not constitute a basic (physical education) program," the Council believes. It urges, however, that intramural sports be available to all as supplemental "builder-uppers," along with interschool sports for the "athletically gifted." Weekends, vacations and after-school hours "should be replete with a variety of organized teams, leagues, tournaments, games and special features."

Council members suggest that no less than 30 minutes daily be devoted to physical education in elementary grades, and no less than "one standard class period per day" in secondary schools.

At the high school level, health education teachers should have either a major in the field or an undergraduate minor bolstered by graduate study, the Council said. Elementary teachers should be "properly prepared" to add health and safety education to other duties, and should have access to a specialist in the field for help and consultation.

Also recommended are enough facilities such as gymnasiums, swimming pools and tennis courts to keep one-sixth of a school's pupil population busy at the same time. Generally, classes should not exceed 35, and the teaching load should not exceed 200 pupils daily.

Tests to measure achievement and diagnose weaknesses should be scheduled regularly. A suggested test battery for schools with limited facilities includes pull ups, sit ups, a shuttle run, a standing broad jump, a soft ball throw, a 50-yard dash and a 600-yard "fast walk."

In its report, "Youth Physical Fitness: Suggested Elements of a School-Centered Program," the Council stresses that fitness programs should be geared to include "girls as well as boys."

* Science News Letter, 80:105 August 12, 1961

PUBLIC HEALTH

Contaminated Tannery Seen Causing Anthrax

► WALKING PAST a tannery that processes imported goat skins was seen as a possible cause of fatal inhalation of anthrax.

Air dissemination of *Bacillus anthracis* could have caused the death of three Philadelphia patients, physicians from the U. S. Public Health Service's Communicable Disease Center, Atlanta, Ga., reported in *The New England Journal of Medicine*, 265: 203, 1961. Three anthrax cases due to inhalation were found in 105 anthrax cases in Philadelphia during a period of nearly 12 years.

Anthrax is an infectious disease of sheep and cattle that may be transmitted to man. Most cases result from occupational exposure to *B. anthracis*. It is unusual to find cases such as the three reported in this study, in which the infecting organism is not evident. A further complication in one of the cases, a 28-year-old Negro man, was the presence of sarcoidosis, a chronic infectious disease of unknown cause.

The investigators said they were unable to explain the association of the particular tanning plant with the three cases of inhalation anthrax. Two of the cases occurred eight years apart, but the contaminated tannery could have been the place of exposure for both.

Drs. Philip S. Brachman, Joseph S. Pagano and Wilhelm S. Albrink, all connected with the Communicable Disease Center, said at least 7,500 persons in the Philadelphia area have "closer daily contact with *B. anthracis* than the three patients" who died of inhalation anthrax. Yet none of the 7,500 have gotten the disease.

Also there are at least 150 individual industrial companies in the Philadelphia area that process animal products contaminated with *B. anthracis*, which results in the production of air-borne infectious material. Yet none of these employees have become infected.

Staff members from the Department of Public Health, Philadelphia, and from several institutions cooperated in supplying information in this rare study.

* Science News Letter, 80:105 August 12, 1961

GENETICS

Genetic Basis for Food Requirements

► JACK Sprat and his wife had some basis for their difference in food taste. There are genetic differences in nutritional requirements.

Dr. F. B. Hutt of the N. Y. State College of Agriculture, Cornell University, Ithaca, said in *Nutritional Reviews*, 19:225, 1961, that the "genetic differences in nutritional requirements may be much greater among races and individuals than has been recognized." His suggestion is based in part on discrepancies between results of experiments on hens in different laboratories.

More studies are needed, Dr. Hutt said, to discover familial differences.

* Science News Letter, 80:105 August 12, 1961

TECHNOLOGY

Power Sources—Old and New

Atomic reactors are important, but so are the sun, the wind and underground steam, as scientists seek answers to one of the world's most challenging problems, David Meier reports.

► THE PROBLEM of finding and developing new sources of power in an increasingly mechanized world deeply concerns scientists everywhere.

It is a problem shared by the most technologically advanced nations, where the flick of a switch commands power equal to that of a hundred human laborers, and the nations just starting to develop, where human and animal muscle power still keeps most of the wheels turning.

Even the countries with the richest reserves of the fossil fuels—coal, gas and oil—are well aware that the fast-dwindling supply will not last forever. Rapid advances in determining new, cheap ways of generating energy are needed now to keep scientists of the future from fighting desperately to save civilization from a power death. Today's scientists are meeting this challenge.

The only really new source of power found in recent years is, of course, atomic energy from man-made reactors. The atomic power industry works constantly at an intensive research and development program aimed at cutting the cost of producing electricity from nuclear sources. In another eight years, studies indicate, present costs of nuclear power should be halved, bringing them into line with power costs from conventional fossil fuel plants.

This is a development which will be welcomed in areas where large industrial centers or extensive electrical transmission systems make large-scale atomic power plants practical.

But it will mean little to such citizens of the modern world as the man in India who cooks the food he needs for his muscle energy over a cow-dung fire, leaving his land, his crops and himself undernourished because the dung should have been used as manure instead.

Needs Solar Stove

While he waits for the advent of inexpensive, small-scale reactors, his present status could be bettered immeasurably by a low priced solar stove to cook his meals by the sun's rays, a windmill to pump water, or a source of hot steam or gases in the earth's crust to generate electricity cheap enough to do both.

The sun, the wind and the boiling kettles in the earth's crust are age-old sources of power, but new ways of harnessing these sources are getting world-wide attention. Scientists, engineers, economic experts and government administrators from 61 nations will discuss them at length when the first United Nations Conference on New Sources of Energy convenes in Rome on Aug. 21.

They will try to devise the best means for putting solar, wind and geothermal energy to work to raise living standards in underdeveloped areas. Geothermal energy, coming from underground steam or hot water, will be examined for the first time on an international basis.

Scientists have rediscovered the sun as a power source. Methods of trapping the sun's rays to serve mankind are increasing in scope and ingenuity. Practical applications of solar energy range from simple solar cookers, the size and shape of an inverted umbrella, to the giant reflector proposed for a solar furnace in Europe's Pyrenees mountains, where a mirror 55 yards in diameter would capture sunlight to generate 1,000 kilowatts.

Ponds and Batteries

Two promising developments due for particular emphasis at the Rome meeting are solar ponds and solar batteries.

Instead of using vast expanses of expensive mirrors, a solar pond traps heat in shallow water. The pond must have a bottom layer

of heavy salt water and a top layer of fresh or less salty water. The black bottom of the pond retains heat, making the bottom layer of water hot. The top layer, with its different density, acts as a lid that keeps the heat from escaping.

Israeli scientists who contrived an experimental "pond" in the Dead Sea found that the surface layer stayed lukewarm, but the salty water two or three feet down got scalding hot.

In sunlit desert countries, the curse of salty waste water could be turned to a blessing if the heat from solar ponds was converted to electricity.

Solar batteries, first built for use in satellites, release electricity when their silicon crystals are activated by sunlight. They are too expensive for any wide use in underdeveloped countries, but continuing research for space applications is expected to bring production costs down. Meanwhile, prospects for the use of treated plastics instead of the costly, delicate crystals are being thoroughly checked.

The use of wind power to pump water or make electricity boils down generally to a problem of getting the right windmill in the right place. Wind is free and plentiful, but unpredictable. More research is needed to locate sites where the supply is relatively consistent, before this neglected resource can be fully utilized.

Windmills Revolutionary

On well-chosen sites, windmills can revolutionize life in remote villages. Windmills with simple sails made of reeds can generate enough electricity to light 30 bulbs of 100 watts each. Big wind installations can develop enough electrical capacity to serve a small community, and might be linked with sun-powered facilities and conventional diesel-generators to form a network so that one power source could begin operating when another stopped.

The importance of power from geothermal steam and gases in underground "kettles" has been recognized only in recent years. Research indicates that many hidden subterranean furnaces may exist in areas where no surface geysers can be seen. Formations where heat sources may exist are expected to be sought and discovered by geologists, geophysicists and geochemists using every modern method available.

Once it is tapped, geothermal power is cheap, constant and reliable. Its use is spreading in Iceland, where power from natural steam fields and active springs heats the homes of 46,000 persons, and Italy, where plants at Larderello can supply enough power to run the entire Italian railway system. New Zealand's Wairakei plant supplies one-eighth of the total power production on North Island, which has a population of more than a million.

The mounting need for new power sources in the United States is clearly in-



POWER IN THE DEEP—Undersea atomic plant will be developed by General Dynamics Corporation, San Diego, Calif., as thermoelectric power source for naval units. Tubes at top change reactor heat to electricity.

dicated in a recent report from the Department of the Interior's Bureau of Mines.

According to 1954 figures cited in the report, fossil fuels supplied 94% of the nation's total energy output. Of this, 38% came from petroleum, 29% from natural gas, and 27% from coal.

Some of the power-producing devices envisioned as replacements for depleted fossil fuel reserves will do their work without the familiar steam-driven turbo-generators, still needed for use with atomic reactors.

Thermoelectric generators will convert nuclear energy or solar energy directly into electricity.

Thermionic generators, working from a nuclear heat source, will convert energy

to electrical form by heating conductive material to cause electrons to "escape" to an outside circuit.

Fuel cells will yield electrical energy from chemical reactions. Units capable of developing thousands of watts of power have been demonstrated.

Magnetohydrodynamics, or MHD, sends gases through a magnetic field at high temperatures and high velocities, providing free electrons such as are found in copper in a conventional generator. Scientists at Westinghouse Electric Corporation, Pittsburgh, have built and operated an experimental MHD generator.

* Science News Letter, 80:106 August 12, 1961

INVENTION

Patents of the Week

► A MANNED BALLOON capsule for studying the upper atmosphere has been patented.

The capsule, one of a series designed for the U. S. Navy's upper atmospheric program, Project Stratolab, was invented by Harold E. Froehlich, New Brighton, and Richard L. Schwoebel, Minneapolis, Minn. Rights of patent No. 2,993,663 were assigned to General Mills, Inc.

"Photographing the atmosphere of other planets in the clear air of the stratosphere and measuring its temperature, ozone content and pressure have been accomplished with these manned balloon junkets," Mr. Froehlich told SCIENCE SERVICE in a telephone interview. In 1956, the first flight in one of these balloons during Project Stratolab lofted Malcolm D. Ross 70,000 feet above the earth, a record height at that time. Since then, a manned balloon flight has topped the 100,000-foot mark.

The compactly built, cylindrical shaped gondola is suspended from a plastic balloon at a 30- to 60-degree angle to provide the smallest possible shell enclosing a man in a sitting position. The flight is controlled by releasing ballast.

The gondola's aluminum-coated nylon "skin" reflects the sun's hot rays during the day, whereas an inside layer of aluminum prevents excessive loss of heat from the pressurized cabin during cold nights. An adjustable seat permits the "space man" to reach the instruments easily or view the upper atmosphere through a porthole.

A method of manufacturing phonograph records that do not collect dust is claimed by three Japanese, Yuzo Miura, Tokyo; Tomomichi Tsukada, Kawasaki-shi; and Shizuo Hayashi, Tsurumi-ku, Yokohama, won patent No. 2,993,234 and assigned the rights to Tokyo Shibaura Electric Co., Ltd., Kawasaki-shi, Japan. An antistatic agent, such as stearamido-propylidimethyl-beta-hydroxyethyl ammonium nitrate, is added to the plastic resin powder for making record disks, obtaining "ever clear phonograph records," the patent claimed. "The present invention can be applied not only to phonograph records but also to electric fan blades and lighting fixtures with favorable results," the inventors said.

"A new concept in ground handling

of heavy aircraft," especially jet planes, is claimed in patent No. 2,993,549 by Jerome I. Davis, Bedford, N. Y., John E. Steinback, Stamford, and Raymond J. Enyeart, Westport, Conn. Rights were assigned to Consolidated Diesel Electric Corporation, Stamford. Huge 125-ton jet aircraft can be taxied from a hangar or parking area to a passenger loading gate with "wheel movers." The self-propelled wheel movers are clamped to the landing gear and can actually move the craft at speeds up to five miles an hour. The plane can be turned by propelling one wheel forward while simultaneously reversing the direction of the other wheel. The units can be controlled by the pilot or a ground crewman.

An improved multi-stage flash evaporator for converting salt water to fresh water won for Charles P. Nilan, Rye, N. Y., patent No. 2,993,844. Rights were assigned to Chicago Bridge & Iron Company, Chicago. Sea water flowing through a maze of pipes is continually heated and then vaporized in a series of compartments. The vapor, now fresh water droplets, is then filtered off. The evaporating compartments are arranged to preheat the incoming cold sea water contained in the pipes.

A "hypodermic syringe" for injecting materials such as antiseptics or fireproofing substances into wooden poles or trees was invented by Stanley Henry Reece, Morden, England. Rights of patent No. 2,993,245 were assigned to Cobra (Wood Treatment) Limited, London. Two needles connected to the syringe are driven into the wood after clamping the unit to the tree. As the needles slowly move into the tree, the piston automatically injects the foreign substance at a uniform rate.

A gas-inflated life preserver that does not tend to lose gas or become dangerously brittle after a period of time is claimed by Richard Switlik, Allentown, N. J., in patent No. 2,993,217, assigned to Switlik Parachute Company, Inc., Trenton, N. J. A baffle within the life preserver spreads the gas evenly when inflating so that any cracking will be limited to the baffle and not occur in the outer fabric, the patent stated.

* Science News Letter, 80:107 August 12, 1961

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Books of the Week

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AFTER THE SEVENTH DAY: The World Man Created—Ritchie Calder—*Simon & Schuster*, 448 p., illus., \$6.95. Handsome volume, gives general reader a fast-moving review of man's history in terms of technological advances and the challenges they present for the future.

ANIMAL ECOLOGY—W. H. Dowdeswell—*Harper*, 209 p., illus., paper, \$1.50. Reprint, shows what is meant by the animal's environment, the kind of results environment influences can achieve, and the role of ecology in evolution.

ART AND ANATOMY—Heidi Lensen; Lancaster M. Greene, Ed.—*Barnes & Noble*, 80 p., illus., paper, \$1.75. Anatomical structures of the human body explained and illustrated.

THE ART OF THE STONE AGE: Forty Thousand Years of Rock Art—Hans-Georg Bandi and others—*Crown*, 249 p., 60 illus. in color, drawings, maps, \$5.95. Presents Franco-Cantabrian rock art and rock pictures of the Spanish Levant, North Africa, South Africa and Australia.

BIOCHEMISTS' HANDBOOK—Cyril Long, Ed., with Earl J. King and Warren M. Sperry, Consult. Eds.—*Van Nostrand*, 1,192 p., illus., \$25. Presents in concise form a wide range of biochemical data, both qualitative and quantitative, arranged for quick reference to serve biochemists and those engaged in closely allied fields.

CALCULUS—George B. Thomas, Jr.—*Addison*

Wesley, 2nd ed., 850 p., illus., \$9.75. Revised textbook of differential and integral calculus, for students who have completed a course in analytic geometry.

THE CALIFORNIA GOLD RUSH—Ralph K. Andrist with Archibald Hanna—*Am. Heritage Pub. (Golden Press)*, 153 p., illus., \$3.50. Colorfully illustrated historical account of the men who mined the rich deposits on the West Coast.

THE CELL AND THE ORGANISM: Essays Presented to Sir James Gray—J. A. Ramsay and V. B. Wigglesworth, Eds.—*Cambridge*, 350 p., illus., \$9.50. Essays describing recent advances in our knowledge of cells and organisms, venturing rather further along speculative lines than is usual in more formal publications.

THE CILIATED PROTOZOA: Characterization, Classification and Guide to the Literature—John O. Corliss—*Pergamon*, 310 p., illus., \$12. Written at graduate level, of interest to research workers in protozoology, parasitology and cell biology.

THE COMMON SPIDERS OF THE UNITED STATES—James H. Emerton, with New Key to Common Groups of Spiders by S. W. Frost—*Dover*, 227 p., illus., paper, \$1.35. Reprint, first published in 1902.

COMPUTER PROGRAMMING FUNDAMENTALS—Herbert D. Leeds and Gerald M. Weinberg—*McGraw*, 368 p., \$8.50. Introductory text on digital computers, written especially for the layman.

A DICTIONARY OF SAILING—F. H. Burgess—*Penguin*, 237 p., illus., paper, 95¢. Includes matter relating not only to craft with sails but also to nautical life in general.

EUROPEAN MILITARY MUSEUMS: A Survey of Their Philosophy, Facilities, Programs and Management—J. Lee Westrate—*Smithsonian Inst.*, 206 p., photographs, \$4. Report on survey of 25 outstanding military museums in 13 European countries.

THE EVOLUTION OF HUMAN NATURE—C. Judson Herrick—*Harper*, 500 p., illus., paper, \$2.45. Reprint of 1956 book discussing the biological factors of the evolution of behavior and of evolution.

A FIRST COURSE IN MATHEMATICAL STATISTICS—C. E. Weatherburn—*Cambridge*, 277 p., paper, \$2.75. Reprint of second edition, provides mathematical foundations of statistics.

FUNDAMENTAL CONCEPTS OF HIGHER ALGEBRA—A. Adrian Albert—*Univ. of Chicago Press*,

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THE SALMON—J. W. Jones—*Harper*, 192 p., photographs, diagrams, \$4. On the natural history of the salmon, zoologist describes in detail the different stages of its fascinating life cycle, for biologists and the general reader.

SCHOOL-INDUSTRY COOPERATION FOR BETTER SCIENCE EDUCATION IN NEW JERSEY—Henry Urrows, Ed., foreword by John T. Connor, pref. by Frederick M. Raubinger—*Edison Foundation*, 32 p., illus., paper, single copies free upon request direct to publisher, 8 W. 40th St., New York 18, N.Y.

THE SCIENTIFIC APPROACH TO CAREER PLANNING—M. C. Cobb—*Lantern Press*, 142 p., \$3.95. Describes major career fields and how to go about applying for jobs in the chosen field.

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STEDMAN'S MEDICAL DICTIONARY—Isaac Asimov and others—*Williams & Wilkins*, 20th ed., 1,680 p., illus., thumb-indexed, \$14.95. Golden Jubilee edition of fully revised up-to-date vocabulary of medicine and its allied sciences, with pronunciations and derivations.

SWAMPS—Delia Goetz—*Morrow*, 64 p., illus. by Louis Darling, \$2.75. Explains for young children how swamps are formed, the ways in which they differ, and the various forms of life found there.

SYMPOSIUM ON HUMAN PROBLEMS IN THE UTILIZATION OF FALLOUT SHELTERS—George W. Baker, John H. Rohrer and Mark J. Nearman, Eds.—*NAS-NRC*, 234 p., illus., paper, \$3. Symposium was held at the National Academy of Sciences in Washington, D. C. on February 11 and 12, 1960.

TESTED WAYS TO HELP YOUR CHILD LEARN—Virginia Burgess Warren—*Prentice-Hall*, 276 p., illus., \$4.95. Among its more than 800 suggestions, tells parents about ways to help a child explore science and how to use television as a teaching tool.

WHITEFOOT: The Story of a Wood Mouse—Robert M. McClung—*Morrow*, 48 p., illus. by author, \$2.75. A life-cycle story for the youngest readers.

WORK-STUDY COLLEGE PROGRAMS: Appraisal and Report of the Study of Cooperative Education—James W. Wilson and Edward H. Lyons, introd. by Ralph W. Tyler—*Harper*, 240 p., \$5.50. Based on the findings and recommendations of a study made under the auspices of the Thomas Alva Edison Foundation.

YOU AND YOUR HEARING—Norton Canfield—*Public Affairs Committee*, Pamphlet No. 315, 20 p., illus., paper, 25¢ direct to publisher, 22 E. 38th St., New York 16, N. Y. Describes types of hearing loss, psychological effects, treatment and hearing aids.

* Science News Letter, 80:108 August 12, 1961

MEDICINE

Blood Clot Removal

► A 37-YEAR-OLD WOMAN owes her life to the first successful removal of blood clots from the lungs during use of a heart-lung machine.

Pulmonary embolism—the closing of the lung artery or one of its branches by a blood clot or other plug brought by the blood current from a distant vessel—has remained a constant threat to life in surgical patients. Despite occasional survival after blood clots have been surgically removed, autopsies of 375,000 patients in the past 50 years showed 10,497 died from pulmonary embolism.

The achievement of Drs. Denton A. Cooley, Arthur C. Beall Jr., and James K. Alexander of the Baylor University College of Medicine and Jefferson Davis Hospital, Houston, Texas, was hailed by the Journal of the American Medical Association, 177:283 and 326, 1961, as "another milestone in cardiovascular surgery."

Editorially, the JAMA said application of the cardiopulmonary bypass for open-

heart surgery has opened an entirely new field, permitting operation for many lesions which formerly were not surgically correctable. Application of this technique to emergency treatment of pulmonary embolism was a logical step.

Quick action is necessary if blood clots in the lungs are not to be fatal. The Houston surgeons recommended that a physician who diagnoses massive pulmonary embolism in a patient should immediately begin "supportive measures, including oxygen inhalation."

The operation they performed included forceful compression of the lungs by hand to remove the many clots present in the patient's lungs. They also tied off the inferior vena cava (trunk for the lower extremities and pelvic organs) to prevent further clots.

The patient had undergone hysterectomy and ovarian tube removal following ruptured tubal pregnancy.

* Science News Letter, 80:109 August 12, 1961

MEDICINE

High Speed X-Rays

► THE EFFECTIVENESS of high speed X-ray motion pictures in spotting calcium salt deposits on heart valves, a condition that interferes with the efficient pumping action of the heart, is being investigated at the University of California, Los Angeles, Medical School.

The study, supported by the Los Angeles County Heart Association, is being conducted at the Harbor General Hospital by Dr. J. H. Woodruff.

Finding out the nature and extent of such deposits is increasingly important, Dr. Woodruff explained, because of the rapid advances in surgery that make it possible to repair defective heart valves.

Simple X-ray pictures have not proved entirely reliable in diagnosing calcification

because the fast action of the valves, opening and closing with each heart beat, blurs the picture. The fluoroscope has been more satisfactory but does not provide a permanent record for detailed study.

* Science News Letter, 80:109 August 12, 1961

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AERONAUTICS—How are designers lowering the death rate from airplane crashes? p. 100.

MEDICINE—What pest is now providing a weapon against fungus infection? p. 99.

Photographs: Cover, U. S. Coast and Geodetic Survey; p. 99, Northrop Corp.; p. 101, General Electric; p. 106, General Dynamics; p. 112, Bradford's, Inc.

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SPACE

Communications Satellites

► DEVELOPMENT of more than one U.S. system of commercial communications satellites is probably "not commercially feasible," the chairman of the Federal Communications Commission told a Senate commerce subcommittee.

Newton M. Minow said the emphasis should be on developing a central system with "a potential capacity for global coverage," giving "equitable access" to other nations who want to use it.

The subcommittee met to consider a resolution by Sen. Vance Hartke (D-Ind.), who wants a six-month study by a special commission charged with evolving a national telecommunications policy, now lacking.

Sen. Hartke said the problem is acute because of increasing demands for use of the radio spectrum. He said Congressional action is imperative to prepare the United States for the International Extraordinary Administrative Radio Conference, to be held in Geneva in 1963.

Because of spectrum limitations, the nation that first launches an experimental commercial communications satellite will have a decided advantage when decisions on usage and allocations are made in Geneva, witnesses agreed.

Jean Felker, assistant chief engineer for American Telephone and Telegraph Company, said his company hopes to have an experimental system operating during the first six months of 1962, and a full commercial system operating by 1965. He said he thought spectrum limitations rule out the scientific feasibility of multiple systems.

The Bell system envisaged by A.T.&T. involves relay satellites in orbit at a height of about 6,000 miles above the earth. Forming "a sort of umbrella over the world," Mr. Felker said, the satellites would be tracked by a ground station that picks up the rising satellite as the previous one "sets." A network of 20 to 40, with self-contained electronic equipment, could carry several hundred telephone conversations at the same time.

A ground station with five large antennas is to be constructed at Rumford, Maine. It will be protectively covered by "a canvas bag that weighs 20,000 pounds but is only one-sixteenth of an inch thick," Mr. Felker said.

Bell's eventual goal, he said, is a com-

munications satellite in a "fixed" orbit about 22,300 miles out in space. Present rocket technology and tracking techniques are inadequate for this, however.

Mr. Minow emphasized that long-distance communications is the immediate goal of the satellite program. He said satellite-to-public television is strictly a long-term objective.

A.T.&T. will build experimental satellites at its own expense, but has a contract with the National Aeronautics and Space Administration under which the Government agency will launch them. NASA later will be reimbursed for launching costs.

* Science News Letter, 80:110 August 12, 1961

SPACE

Both Private and Public Satellites Due in Year

► THE BATTLE over private or Government ownership of communications satellites is now changing scene from earth to space.

Two communications satellites—one privately financed, the other built with Government funds—are scheduled to be launched into orbit within a year, according to the National Aeronautics and Space Administration in Washington, D. C. Both shots are primarily experimental, aimed at eventually developing a world-wide communications system.

NASA's recently announced contract, granted to American Telephone and Telegraph Company to build two to four satellites at its own expense, supports President Kennedy's endorsement of private ownership and operation of the U. S. portion of any space communications program. The contract gives A.T.&T. a fairly free hand, with NASA requiring only that all information obtained from the experiments be available to the Federal space agency.

"The communications satellite shots reflect the urgent need to bring global communication to the operational stage," Dr. Leonard Jaffe, chief, NASA's communications program, told SCIENCE SERVICE. However, he said that much more research is needed before the satellite system becomes truly operational.

A.T.&T. satellites are scheduled to be launched into space next April and October astride a Thor-Delta rocket. If successful, two other shots will probably then be attempted.

The 125-pound, sphere-shaped satellites will carry instruments capable of handling different kinds of communications. They will be put into orbits ranging from 600 miles at the nearest point to as much as 3,000 miles out in space.

The NASA satellite, which is being built by the Radio Corporation of America (RCA), is expected to be launched next July. Its function will be similar to the privately owned satellites.

* Science News Letter, 80:110 August 12, 1961

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HUMAN HEAD MODEL, life-size, shows head and neck and is molded in four colors. Useful as an anatomical teaching aid, it can be assembled and disassembled. The ear, eyes, brain, spinal cord and organs of the mouth and throat are presented in detail. A 16-page fully illustrated handbook is included.

• Science News Letter, 80:112 August 12, 1961

MULTI-COLOR BALL POINT PEN writes in four colors by just turning to the desired color as shown on the cap rim and pressing down the cap. All metal, it is imported from West Germany. Refills are available.

• Science News Letter, 80:112 August 12, 1961

CASTER CUPS for use on hard-surfaced floors come in two types, non-skid with a rubber cushion and free-sliding with a carpet cushion. Of tough plastic, they will not dent floors, nor rust, and are detergent resistant. They are available in sets of four in two sizes for blonde and dark furniture.

• Science News Letter, 80:112 August 12, 1961

MERMAID PONY TAIL, shown in the photograph, is artificial hair that can be attached by means of a special waterproof adhesive to swim caps and beach hats or pinned to a person's short-cut hair. The pony tail comes in four natural hair



colors and can be combed, braided or curled.

• Science News Letter, 80:112 August 12, 1961

CORNER DISTILLATION RACK utilizes usually wasted laboratory corner space. The two panels permit two independent complex setups to be carried on

simultaneously in the laboratory. Both vertical and horizontal rods are adjustable and services for water and drain, gas, air, vacuum, steam and electricity are conveniently located. In gray or green, the rack is 10 feet 6 inches along each wall, 8 feet high and 2 feet 6 inches deep.

• Science News Letter, 80:112 August 12, 1961

POCKET POST OFFICE in a genuine pigskin case is handy for pocket or purse. Its built-in features include a stamp case, address-memo book, zippered money pocket, two extra utility pockets, a slim-style mechanical pencil, memo pad and a postal scale.

• Science News Letter, 80:112 August 12, 1961

HIGH-SPEED TIRES for police and other emergency vehicles are made of 4-ply nylon with a scientifically determined cord angle designed to eliminate shock waves that cause blowouts. The tubeless tires come in four sizes to fit virtually all cars.

• Science News Letter, 80:112 August 12, 1961

U. S. FLAG EMBLEMS for display on luggage, books, house doors or gift packages, are 2½ by 1¼-inch self-adhering labels of the 50-star flag. Sticking instantly to metal, leather, paper, wood or plastic, they do not harm the surface when removed.

• Science News Letter, 80:112 August 12, 1961



Nature Ramblings



Do You Know?

► THE SONG of the cicada is an unmistakable sign of approaching autumn. Some weather-wise prophets believe frost is only six weeks away, "because the locusts are singing."

It may be six weeks until frost, but the insect is singing to his mate, or perhaps merely singing for the fun of it, and cares nothing about the weather except that he likes it hot. The creature is not a locust, for a locust is a kind of grasshopper, and the cicada is a true insect, that is, with a long piercing beak instead of chewing jaws.

The dog-day cicada is a relatively long-lived insect. It exists as a grub or larva in the ground for two or three years, sucking the juices from the roots of plants. When it reaches maturity, the cicada tunnels to the surface of the ground, and some day, when there is no threat of rain, it comes out, crawls up the tree trunk and emerges from its shell as a fully formed winged insect.

The life history of the 17-year cicada is essentially the same, except that this species

Cicadas



is the longest-lived insect known to entomologists.

After their 17-year underground life, these insects spend only two or three months at most above ground. Their only function as adults is to mate, produce eggs for the next generation and then die.

The eggs are laid in the tender bark of young twigs, which are killed by the feeding of the newly hatched grubs. Later the larvae drop to the ground and dig themselves in for their long subterranean existence.

• Science News Letter, 80:112 August 12, 1961

A simple, inexpensive technique for evaluating blood circulation of the liver by injecting isotopes into the spleen allows the diagnosis to be made immediately at the patient's bedside.

The Japanese beetle feeds on 280 different kinds of plants.

As early as 940 B.C. the Chinese had discovered and harnessed natural gas.

More than 80% of personal injury accidents on the highways still involve driving violations and the fact that deaths have not risen sharply in recent years is due largely to better and more prompt medical care rather than care on the part of the drivers.

Super sensitive films have opened the door to almost universal use of photographic instrumentation for intricate research under difficult conditions.

• Science News Letter, 80:112 August 12, 1961

